

**REMARKS**

Claims 15-24 are pending in the present application. Claims 1-14 are herein cancelled.  
Claims 15-24 are newly added. Claim 24 is withdrawn.

**Claim Rejections - 35 U.S.C. § 112**

Claim 7 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The Office Action states that the language of claim 7 is unclear. Claim 7 has been cancelled. New claims 18, 19 and 20, corresponding to claim 7, have been edited for clarity.

Withdrawal of the rejection of claim 7 is requested.

**Claim Rejections - 35 U.S.C. § 103**

Claims 1-10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over **Krahne**, (*Fabrication Of Nanoscale Gaps In Integrated Circuits*, Applied Physics Letters, American Institute Of Physics, Vol. 81, No. 4, pp 730-32, July 22, 2002, XP001130351), in view of **Lieber** (US 7,129,554).

Favorable reconsideration is requested.

New claim 15, which is a combination of cancelled claims 1, 2 and 5, comprises a semiconductor hetero-structure having electrodes separated by a nano-gap and being situated on a cleaved plane and organic molecules connecting them for use in molecular electronics or molecular electronics-based biosensor applications.

Krahne presents a hetero-structure device demonstrating single-electron transistor (SET) operation only. Such SET devices are single standing devices based on particular mesoscopic physics effects in metal or semiconductor structures but are not intrinsically dependent on molecules. A SET does not depend on molecular electronics. The use of metalized DNA networks as cited in Krahne is different and relates to solving the “connectivity issue,” *i.e.*, templated metallic wiring of circuits.

(1) Applicants respectfully submit that Krahne in view of Lieber does not teach or suggest:

wherein the conductive source and drain electrodes are situated on a selectively etched cleavage plane oriented perpendicular to the hetero-structure layer plane

as recited in new claim 15. The presence of a cleaved plane in the device of Krahne is not disclosed.

(2) Applicants respectfully submit that Krahne in view of Lieber does not teach or suggest:

the groove-like nano-gap is bridged by one or more conductive organic wires which are organic molecules with a conjugated  $\pi$ -electron system or DNA oligonucleotides being connected with the conductive source and drain electrodes of the semiconductor hetero-structure

as recited in new claim 15.

The Office Action acknowledges that Krahne does not disclose an organic wire. (Office Action, page 3.) The Office Action cites Lieber for disclosing a carbon nanotube nanowire.

Lieber discloses that the nanowire can be organic or inorganic conductive and semiconducting polymers. (Col. 9, lines 28-32.) However, Lieber does not disclose conductive organic wires which are organic molecules with a conjugated  $\pi$ -electron system or DNA oligonucleotides.

(3) Applicants respectfully submit that it would not have been obvious to combine Krahne and Lieber because Lieber does not disclose electrodes with nanoscale separation.

Lieber discloses that:

the distance between electrodes 36 is about 500 nm. In certain preferred embodiments, electrode distances will range from 50 nm to about 20000 nm [1], more preferably from about 100 nm to about 10000 nm, and most preferably from about 500 nm to about 5000 nm.

(Col. 16, lines 39-47.) Thus, it would not have been obvious to combine Krahne and Lieber.

For at least the foregoing reasons, claim 15 is patentable over the cited references, and claims 16-23 are patentable by virtue of their dependence from claim 15. Accordingly, withdrawal of the rejection of the claims is hereby solicited.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

Application No.: 10/530,870  
Art Unit: 2818

Amendment under 37 C.F.R. §1.114  
Attorney Docket No.: 052275

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,  
**WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP**

A handwritten signature in black ink, appearing to read 'A. Melick', is written over the printed name.

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